(12) UK Patent Application (19) GB (11) 2 247 904 (13) A

(43) Date of A publication 18.03.1992

(21) Application No 9019995.1

(22) Date of filing 13.09.1990

(51) INT CL[5]
E21B 17/00

(52) UK CL (Edition K)
E1F FAC FAC3

(56) Documents cited
GB 2180124 A GB 2164681 A EP 0056872 A1
US 4578991 A

(58) Field of search
UK CL (Edition K) E1F FAC FHH FHK FHU
INT CL[5] E21B
Online databases: WPI

(71) Applicant
AXL Systems Limited

(Incorporated in the United Kingdom)

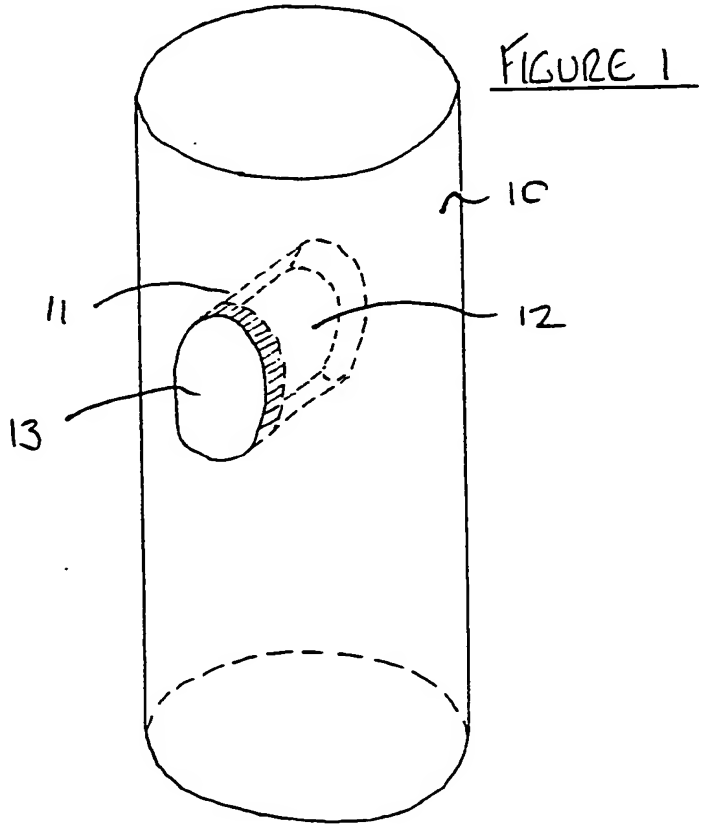
North Road, Middlesborough, Cleveland, TS2 1DE, United Kingdom

(72) Inventor
Paul Christopher Gilhooley

(74) Agent and/or Address for Service
Urquhart-Dykes & Lord
Cardiff Business Technology Centre,
Senghennydd Road, Cardiff, CF2 4AY, United Kingdom

(54) **Identifying metal articles**

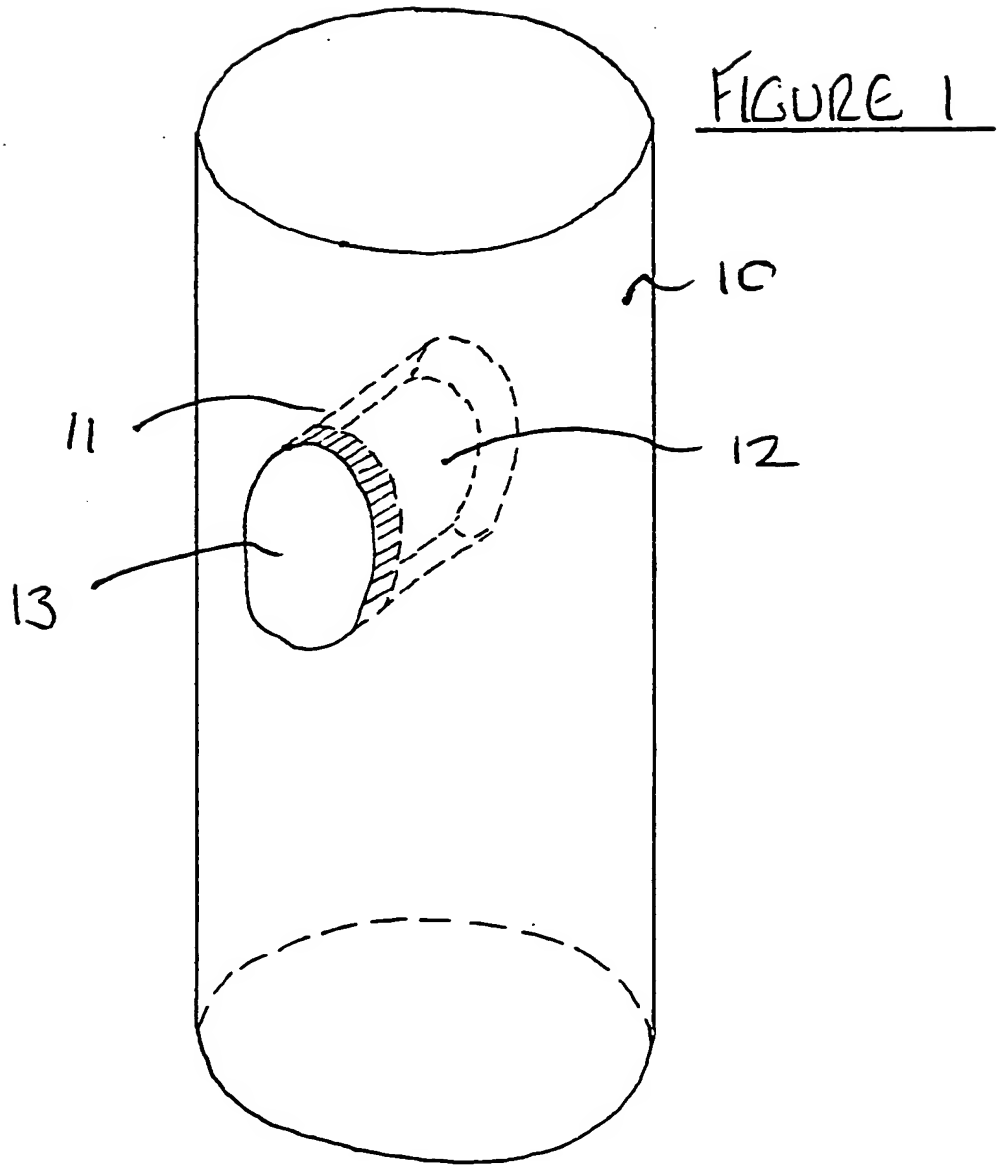
(57) An article of metal 10 has a data storage device or tag 12 embedded therein, the tag 12 being arranged for electrostatically and/or electromagnetically coupling to an external read/write sensor. The article may comprise a drill pipe used in boring in oil or gas exploration. The tag 12 stores data identifying the article and also historical data as to the previous working life of the article: the latter data can be updated.



The claims were filed later than the filing date within the period prescribed by Rule 25(1) f the Patents Rules 1990.

GB 2 247 904 A

FIGURE 1



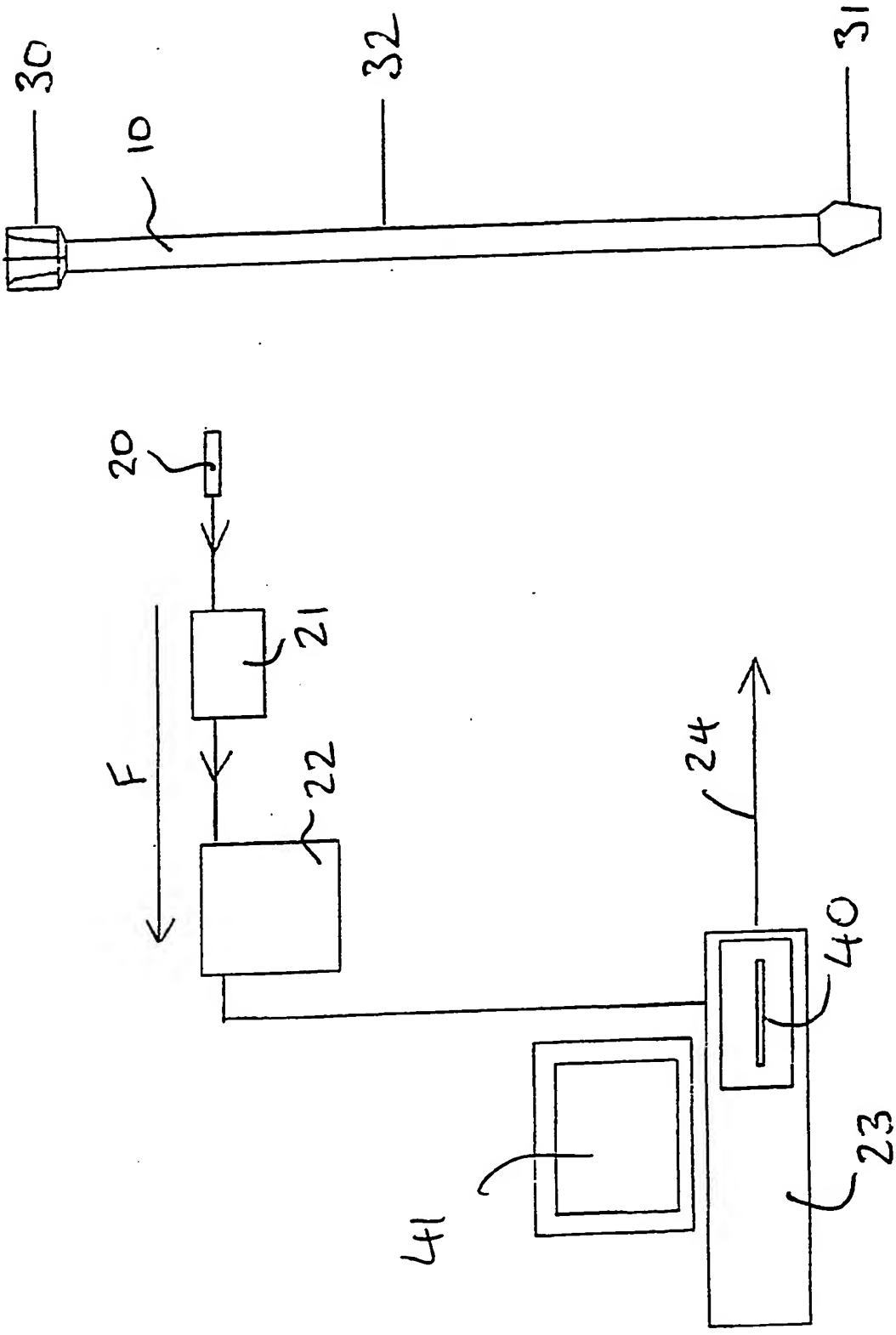


FIGURE 2

Identifying Metal Articles

This invention relates to arrangements for identifying metal articles.

It is known in the oil and gas exploration industries and in the chemical and petrochemical industries to clearly identify items such as pipes, valves, flanges and pressure vessels by marking them with a serial number. The history of a particular item can be discovered by looking up its serial number in record files. Due to the large amount of paperwork and difficulty of accessing the information required, this system has been replaced with a bar coding system in several instances..

The serial number of the item is represented by a unique pattern of alternate light and dark lines which can be read by a light emitting scanner. A microcomputer is connected to the scanner and decodes the signals from the scanner thus identifying the item scanned. The item's history is held in storage in the computer and is displayed once it has been scanned. The bar codes are either printed on adhesive labels and stuck to the item, or are printed on a tag which is affixed to the item. Adhesive labels tend to peel off after periods of time, and also may wear off if the surface of the item is subjected to abrasion. Tags affixed to the item can become separated from it, preventing identification of that item.

Further, the information about the item is only available to people who have a disk or other medium containing the information. Therefore a person who buys the item secondhand knows nothing about its history even if he had the correct hardware to read the bar code.

We have now devised arrangements whereby articles may be provided with a tag which will not become worn or separated from the article and which can store data about the article's history without the need for a separately stored case history.

In accordance with this invention there is provided an article of metal having a data storage device embedded therein, the data storage device being arranged for electrostatically and/or electromagnetically coupling to an external sensor.

Preferably a hole is formed in the metal article, and the data storage device is disposed in the hole. Preferably the hole is subsequently plugged with a material to prevent the data storage device from becoming dislodged.

Preferably the material is an expoxy resin.

This invention may be applied to a wide variety of articles in many different industries, including the oil and gas exploration industries and the chemical and petrochemical industries. In particular, drill pipes used in boring, in the oil and gas exploration industries may be provided with embedded data storage devices in accordance with this invention.

An embodiment of this invention will now be described by way of example only, and with reference to the accompanying drawings, in which:

FIGURE 1 is a perspective view of a section of drill pipe in which a data storage device is embedded, in accordance with this invention, and;

FIGURE 2 is a block diagram of a system for automatically identifying the drill pipe of Figure 1.

Referring to Figure 1 there is shown a section of drill pipe 10. The section comprises an elongate cylindrical member in which a hole 11 is formed radially inwards. The hole 11 extends along only part of the diameter of the drill pipe 10. A cylindrical tag or data storage device 12 is disposed axially within the hole 11. A blanking member 13 fills the opening of the hole 11 and contains the tag 12 therein.

Figure 2 shows the drill pipe 10, which comprises an elongate shaft 32 having opposite ends 30, 31 formed with female and male couplings respectively. A sensor element 20 is laterally mounted a short distance away from the axis of the

drill pipe 10 and has its output connect d to a tag interface unit 21. A microprocessor controlled tag read/write unit 22 connects the tag interface unit 21 to a computer system 23. The computer system 23 includes a magnetic storage medium 40 and cathode ray tube 41. An output 24 from the computer may connect to any networking or process control system (not shown).

In use drill pipes of up to 100 ft in length e.g. 10, are coupled together to form a drill string. A drill tip or roller bit is fitted to the first drill pipe e.g. 10, which is suspended from a drilling derrick. The drill pipe is rotated via a turntable connected to a square rod at its top. Once the drill pipe has penetrated the earth a suitable distance, another drill pipe may be fitted. This process is repeated until the drill reaches its required depth, which is often 6000 metres. The strain on the drill pipes is quite considerable especially when they are rotating at 900 RPM, with drilling progress rates of 20 metres/hour. The last drill pipe in the string is subjected to the most torque, whilst lower drill pipes are subjected to bending and strain.

It is important that no drill pipes break, which would result in loss of the drilling equipment and a great deal of time wasted. Therefore it is vital to know exactly what stress, strains and torques each section of drill pipe has been subjected to before it is used. The system shown in figure 2 shows a drill pipe 10 in which an electromagnetic tag 11 has been embedded. In other embodiments however alternative tag coupling arrangements may be adopted. A sensor 20 is mounted laterally on the drilling derrick away from the axis of the drill pipe 10. As the drill pipe 10 rotates and advances into the earth, its section having the tag 12 embedded in it passes the sensor. The sensor 20 excites the tag electromagnetically as it passes. Once excited the tag 12 transmits a code e.g. 64 bits as its identity. The tag can also be read/written with bits of variable data.

The information contained in the tag 12 will

include its serial number, and history about its previous working life e.g. the position in which it has been used in any string, repair details, bends, torques and stresses. Other details may also be provided.

This data can be updated, read or written whilst the drill is being advanced or withdrawn, the parameters being measured by ancillary measuring equipment.

The tag sensor 20 is connected to a computer 23 via two interfaces 21, 22. The computer 23 interprets and analyses the data F from the tag 12 and displays it on a screen 41, it also may provide details for storage on magentic or other storage media 40. An output 24 may connect to a process flow system to stop the drilling if a faulty drill pipe 10 is identified for example.

In another embodiment the tag sensor may be hand held to interrogate the tag 12 before the drill 10 is used. Alternatively the teachings of this invention are applicable to other areas where it is important to know the history of a particular piece of equipment e.g. a valve in a nuclear power station. The data contained in the valve may contain maintenance records for example.

A person having a tag reader and associated software can learn the full history of any piece of equipment fitted with a tag. Thus a person buying secondhand knows exactly what he is buying.

Claims

1) An article of metal having a data storage device embedded therein, the data storage device being arranged for electrostatically and/or electromagnetically coupling to an external sensor.

2) An article as claimed in claim 1, formed with a hole in which the data storage device is disposed.

3) An article as claimed in claim 2, in which the hole is plugged with a material over the data storage device to prevent the latter becoming dislodged.

4) An article as claimed in claim 3, in which the material with which the hole is plugged comprises an epoxy resin.

5) An article as claimed in any preceding claim, in which the data storage device stores data identifying the article.

6) An article as claimed in any preceding claim, in which the data storage device stores historical data as to the previous working life of the article.

7) An article as claimed in claim 6, in which said historical data can be read from the storage device and can be updated.

8) An article of metal as claimed in any preceding claim, which is drill pipe used in boring in the oil or gas exploration.

Published 1992 at The Patent Office. Concept House. Cardiff Road. Newport. Gwent NP9 1RH. Further copies may be obtained from h. Unit 6. Nine Mile Point. Cwmfelinfach. Cross Keys. Newport. NP1 7HZ. Printed by Multiplex techniques ltd. St Mary Cray. Kent.